

Multiple Choice Answers

Q34: A

Q35: D

Q36: D

Q37: C

5(a)	<u>sum of</u> current(s) into junction = <u>sum of</u> current(s) out junction or (algebraic) sum of current(s) at a junction is zero
5(b)(i)	line with negative gradient line from 0 °C to 100 °C, starting at (0, R_0) with negative gradient throughout and never reaching $R = 0$
5(b)(ii)	(resistance of T decreases so) total resistance (of circuit) decreases current in cell increases (so p.d. across internal resistance increases) terminal p.d. decreases (and resistance of R is constant) so current in R decreases
5(c)(i)	p.d. across $r = 1.50 - (6.00 \times 0.200)$ $(= 0.30 \text{ V})$ current in cell $= 0.30 / 0.12$ $= 2.5 \text{ A}$
5(c)(ii)	current in thermistor $= 2.5 - 0.200$ $(= 2.3 \text{ A})$ resistance of T $= (6.00 \times 0.200) / 2.3$ $= 0.52 \Omega$

5(a)	<u>sum of</u> current(s) into junction = <u>sum of</u> current(s) out junction or (algebraic) sum of current(s) at a junction is zero
5(b)(i)	$(V =) E - Ir$ $(V =) 5.0 - (38 \times 10^{-3} \times 4.7) = 4.8 \text{ (V)}$
5(b)(ii)	$R_{(Z)} = 120 \Omega$ $I_2 = 38 \times 10^{-3} - (4.8 / (100 + 120))$ $I_2 = 0.016 \text{ A}$ or $R_{(Z)} = 120 \Omega$ $R_{(\text{EXT})} = 4.8 / 38 \times 10^{-3}$ $(= 126 \Omega)$ $1 / R_{(Y)} = 1 / 126 - 1 / (120 + 100)$ $(R_{(Y)} = 297 \Omega)$ $I_2 = 4.8 / 297$ $I_2 = 0.016 \text{ A}$

5(b)(iii)	$P = IV$ or $P = I^2 R$ or $P = V^2 / R$ $P = 0.016 \times 4.8$ or $P = 0.016^2 \times (4.8 / 0.016)$ or $P = 4.8^2 / (4.8 / 0.016)$ $P = 0.077 \text{ W}$
5(b)(iv)	resistance of the LDR / Z increases (as light intensity decreases) <u>total</u> resistance (of the circuit) increases or current <u>in the battery</u> decreases (potential difference across the internal resistor decreases so) the terminal potential difference increases

1	Defining the problem vary v and measure I or v is the independent variable and I is the dependent variable keep A and R <u>constant</u> Methods of data collection labelled diagram of workable experiment including: - fan positioned in line with the turbine so that blades of both fan and turbine overlap - fan on bench - fan labelled and one other label from bench, turbine, blade(s) (of turbine), terminals, L workable circuit diagram showing resistor connected to an ammeter in series with the terminals of the turbine using correct circuit symbols method to vary v , e.g. change speed of fan / change distance between fan and blades / vary current in or p.d. across fan method to determine temperature T , e.g. use a thermometer Method of Analysis plot a graph of I^2 against v^2 or equivalent (e.g. $\lg I$ against $\lg v$ or $2 \ln I$ against $\ln v$) relationship valid <u>if</u> a straight line is produced passing through the origin (For $\lg I$ against $\lg v$: relationship valid <u>if</u> a straight line <u>with gradient = 1.5</u> is produced) $Q = \frac{2TR \times \text{gradient}}{AP}$ (For $\lg I$ against $\lg v$: $Q = \frac{2TR \times 10^{2 \times y\text{-intercept}}}{AP}$)
---	--

1	Additional detail including safety considerations
	D1 precaution with reason linked to (moving) fan blades / turbine blades, e.g. keep away from the fan to avoid (moving) blades or use a screen around the fan / turbine to avoid (moving) blades or precaution with reason linked to prevent air / dust particles in eye, e.g. use goggles to avoid air stream (into eye)
	D2 clamp turbine / fan <u>to bench</u>
	D3 keep P and T <u>constant</u>
	D4 $T = t + 273$
	D5 method to determine A : use a rule(r) / calipers to measure L and $A = \pi L^2$
	D6 repeat measurements of L in different positions / different blades and average
	D7 method to measure v , e.g. use an anemometer or <u>air speed</u> meter or method to measure P , e.g. use a manometer or barometer or <u>pressure</u> gauge
	D8 wait for steady / constant air flow / movement of blades / current
	D9 method to determine R , e.g.: separate circuit showing ohmmeter connected to R only or terminals of turbine connected correctly to resistor and ammeter and voltmeter across resistor and $R = V / I$ or separate workable circuit with power supply resistor, ammeter and voltmeter across R and $R = V / I$
	D10 method to check temperature / pressure is constant, e.g. measure temperature / pressure several times / before and after

Multiple Choice Answers

Q36: D